Technical Bulletin #58:

# General Pesticide Formulation

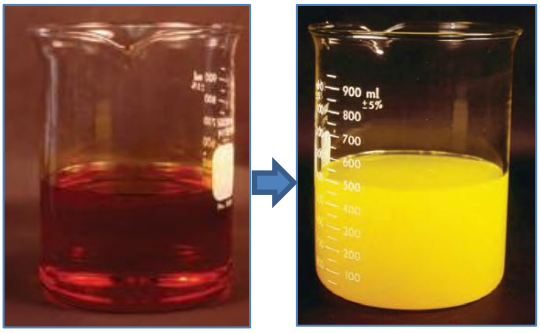
Pesticide formulation may contain one or more active ingredients which have a specific effect on a pest, weed, or disease and are classified as liquid or dry formulations. On the label, it is often abbreviated such as EC, WP, SC, etc. as a suffix to the brand or trade name of the pesticide product. The table below explains the meaning of some common abbreviations of pesticide formulations sold in Cambodia and their advantages and disadvantages.

## 1. Emulsifiable Concentrated (EC or E)

An EC formulation usually contains liquid active ingredients, one or more petroleum solvents and emulsifiers, which allows the formulation to be mixed with water before spraying.

Example: Cyperan 5EC, Armada 50EC, Vicare 36EC, Diazan 50EC, Silsau 1.8EC, Perkill 25EC etc.

| Advantages: | Disadvantages: |
|---|---|
| - Easy to handle, transport and store.<br>- Little agitation required; will not settle out or separate when equipment is running.<br>- Little visible residue on fresh fruits and vegetables or treated surfaces. | - High concentration makes it easy to overdose or under-dose through mixing or calibration errors.<br>- Can only be used with soluble active ingredients or solvents.<br>- Usually has a greater phytotoxicity hazard.<br>- Solvents may cause rubber or plastic hoses, gaskets, and pump parts and surfaces to deteriorate.<br>- Flammable, should be used and stored away from heat or open flame, and may be corrosive. |



Emulsifiable concentrate before mixing

Emulsifiable concentrate after mixing

## 2. Flowables (L or F or FL)

A liquid formulation consisting of a finely ground active ingredient suspended in a liquid. Flowables are mixed with water for application and are similar to EC formulation but easier to handle and use. These are used in the same types of pest and disease control operation as ECs are used.

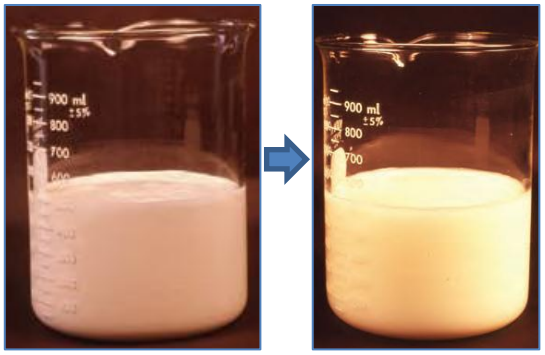
Example: Dibavil 50FL, Carbenzim 500FL, Pesguard Alpha 5FL etc.

| Advantages: | Disadvantages: |
|---|---|
| - Rarely clogs nozzles.<br>- Easy to handle and apply. | - Must shake thoroughly before pouring and mixing.<br>- May leave a visible residue. |

## 3. Suspension Concentrate (SC)
**(= flowable concentrate)**

A stable suspension of active ingredient(s) with water as the fluid, intended for dilution with water before use.

Example: Anvil 5SC, Apolo 2.5SC, Annongvin 50SC, etc.



Liquid Flowables before mixing

Liquid Flowables after mixing

## 4. Soluble Concentrate (SL)

Soluble concentrate is a liquid formulation with active ingredient(s) already dissolved in water and is therefore only diluted in the spray tank mix.

Example: Kavali 5SL,Graphic 48SL, Lyphosim 48SL, etc.

Soluble concentrate before mixing

Soluble concentrate after mixing

**Advantages:**
Not abrasive to equipment and will not plug strainers and screens.

**Disadvantages:**
Some pesticides produced as dissolved salt can be caustic to human skin.

## 5. Dust (D)

Pesticide formulation consists of dry particles that are always applied dry. Dust is widely used as seed treatments and sometimes for agricultural application.

**Advantages:**
- Usually ready to use, with no mixing.
- Effective where moisture from a spray might cause damage.
- Requires simple equipment.
- Effective in hard-to-reach indoor areas.

**Disadvantages:**
- Easily drifts off target during application.
- Residue easily moved off target by air movement or water.
- May irritate eyes, nose, throat, and skin.
- Will not stick to wet surfaces or liquids.
- Dampness can cause clogging and lumping.
- Difficult to get an even distribution of particles on surfaces.

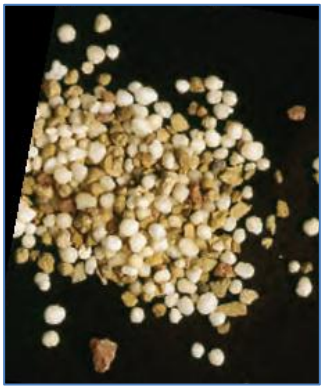
Dust formulation

## 6. Granules (G) or (GR)

These formulations are similar to dust formulations except that granular particles are larger and heavier. They are most often directly applied in soil, without mixing, to control weeds, nematodes, and insects living in the soil. The active ingredient that is used may also be systemic which is applied to the soil then absorbed into the plant through the roots and carried throughout the plant.
Example: Diaphos 10G, Ranger 0.3G, Panil 0.3G etc.

**Advantages:**
- Ready to use; no mixing and no storage problems.
- Drift hazard is low; particles settle quickly.
- Low hazard to applicator; no spray, little dust.
- Weight carries the formulation through foliage to soil or water target.
- Simple application equipment needed, such as seeders or fertilizer spreader.

**Disadvantages:**
- Do not stick to foliage.
- More expensive than WPs or ECs.
- May need to be incorporated into soil.
- May need moisture to activate pesticide.
- May not be effective under drought conditions because the active ingredients is not released in sufficient quantity to control the pest.
- May be hazardous to non-target species, especially waterfowl and other birds that mistakenly feed on the seed-like granules.



Granules formulation

## 7. Wettable Powder (WP or W)

Wettable powders are dry, finely ground formulations that look like dust. They usually must be mixed with water for application as a spray. Wettable powder particles do not dissolve in water, but they settle down quickly unless constant agitation is used to keep them suspended. This formulation must not be mixed with ECs.

Example: Daconil 75WP, Kalonil 75WP, Xylcozeb 680 WP, Kamanta 72WP, Sethey 720WP etc.

**Advantages:**

- Easy to store, transport and handle.
- Low cost.
- Lower phytotosicity hazard than ECs and other liquid formulations.
- Easily measured and mixed.
- Less skin and eye absorption than ECs and other liquid formulations.

**Disadvantages:**

- Inhalation hazard to applicator while pouring and mixing the concentrated powder.
- Require good and constant agitation (usually mechanical) in the spray tank.
- Often clog nozzles and screens. Residues may be visible on treated surfaces.

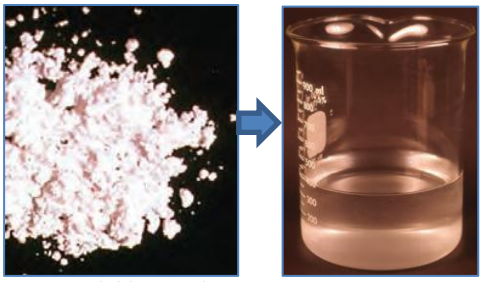
Wettable powder before mixing

Wettable powder After mixing

## 8. Water Soluble Powder (WSP) or (SP)

Dry formulations look like wettable powders. However when mixed with water, soluble powders dissolve readily and form a true solution. After they are mixed thoroughly, no additional agitation is necessary. Soluble powders have all the advantages of wettable powders and none of the disadvantages except the inhalation hazard during mixing.

Example: Ascend 20SP, Goliath 10SP, Progibb 10SP etc.



Water Soluble Powder before mixing

Water Soluble Powder after mixing

References:

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3. Pesticide formulations, E.J. Buffington, S.K. McDonald , Pesticide Fact Sheet # 105 CEPEP 5/00 Update6/06 or http://www.cepep.colostate.edu/
4. Pesticide formulation, University of Florida ( http://edis.ifas.ufl.edu/pi231)

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